Studies in general physiology.

THE APPEARANCE OF LOEB'S *Studies in general physiology*[2] should give new impetus to the already active research in regard to the factors which control vital phenomena. No one has emphasized more clearly the essential similarity existing between the protoplasms of the two kingdoms than has this writer, and the present work promises to be of great use to plant as well as to animal physiologists.

These two volumes, of the Decennial Series of the University of Chicago, bring together in reprint the list of brilliant contributions which gave to the author his prestige in protoplasmic physiology. They consist of thirty-eight papers, published through various channels and in two languages, between the years 1889 and 1902. These are arranged in the chronological order of their previous publication, beginning with those on tropisms and ending with those on artificial parthenogenesis and on the irritability of muscles. Some of them have been somewhat shortened by the omission of repetitions which are unnecessary in the collected series; those originally published in German have been excellently translated into English by Dr. MARTIN FISCHER, and considerable additional light has been thrown upon certain points by appended footnotes bearing the date 1903.

The author and the physiological world as well are to be congratulated upon the attractive form of the publication. The volumes are printed upon a good quality of paper, and in type which is easily read. Illustration is by means of very clear figures in the text, and the citations of literature are where they should be, namely at the base of the page on which reference is made.

The only cause for regret to be felt by the reader of these volumes comes from the thought of how much more valuable the work might have been had it but taken the form of a treatise on the physiology of protoplasm; for in such a form the author might not only have connected his ideas into a more available whole, but also would have been offered a better opportunity to give to the reader the benefit of his broader view of the suggestions arising therefrom.—B. E. LIVINGSTON.

NOTES FOR STUDENTS.

ITEMS OF TAXONOMIC INTEREST are as follows: F. S. EARLE (Bull. N. Y. Bot. Gard. **3**:289–312. 1905) has published 33 new species of West-American fungi and 19 new species of tropical (mostly Porto Rican) fungi.—J. K. SMALL (*idem* 419–440), under the title "Additions to the flora of subtropical Florida," has published new species in Stenophyllus, Limodorum, Quercus (2), Phytolacca, Aeschynomene, Linum (2), Polygala (4), Phyllanthus, Croton, Stillingia, Chamaesyce, Gaura, Proserpinaca, Adelia (2), Rhabdadenia, Jacquemontia, Heliotropium, Lantana, Verbena, Scutellaria, Ruellia, Ernodea, Melanthera, and Carduus.—P. A. RYDBERG (Bull. Torr. Bot. Club **32**:123–140. 1905), in his

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[2] LOEB, JACQUES, Studies in general physiology. Part I, pp. xiii+423. Part II, pp. xi+425–782. Decennial Publications, The University of Chicago 1905.

14th paper entitled "Studies on the Rocky Mountain flora," has described new species in Machaeranthera (3), Xylorrhiza, Erigeron (7), Antennaria, Helianthus, Tetraneuris (2), Artemisia (3), Pyrrocoma, Tetradymia, Arnica, Carduus (5), Gaertneria, Crepis (5), Agoseris (5), and Taraxacum.—H. D. HOUSE (*idem* 139–140) has described two new species of Convolvulus from the western United States.—M. L. FERNALD and C. H. KNOWLTON (Rhodora **7**:61–67. *pl. 60.* 1905), in presenting *Draba incana* and its allies in northeastern America, have described two new species.—C. K. SCHNEIDER (Bull. Herb. Boiss. II. **5**:335–350. 1905) has published a synopsis of the species of Spiraea (Euspiraea), recognizing 57 and describing 8 as new.—G. LINDAU (*idem* 367–374), in his fourth paper on American Acanthaceae, has described a new genus (*Diateinacanthus*) from Honduras, and also 9 new species.—C. K. SCHNEIDER (*idem* 391–403, 449–464), in continuing his synopsis of Berberis, includes 53 species, 12 of which are new.—C. DECANDOLLE (*idem* 417–427) has published an account of the Meliaceae of Costa Rica, recognizing 23 species, 15 of which are described as new.—R. CHODAT (*idem* 481–506), in continuing his publication of Hassler's Paraguay collection, has described a new genus (*Aporosella*) and 16 new species of Euphorbiaceae.—A. W. EVANS (Bull. Torr. Bot. Club **32**:179–192. *pl. 5.* 1905) has described 3 new liverworts from Florida.—ALICE EASTWOOD (*idem* 193–218) has described new western species of Clematis, Aquilegia, Myosurus, Horkelia, Astragalus, Vicia (2), Lathyrus, Thermopsis, Rosa, Heuchera, Lithophragma, Jepsonia, Arctostaphylos (2), Cynoglossum, Cryptanthe, Phacelia, Polemonium, Pentstemon (6), Orthocarpus (4), Castilleia, Antirrhinum (2), Collinsia, Chrysoma (2), Raillardella, Hieracium, and Lessingia.—J. M. C.

PROTEID SYNTHESIS in developing peas forms the subject of a paper by ZALESKI.[3] In one series of expermients the ripening seeds were cut in halves and kept several days in either a dry atmosphere or one saturated with water. In either case the analyses of the seeds at the beginning and end of the experiments showed that there was an increase in the proteid content and a corresponding decrease in the content of asparagin, amido-acids, and hexon bases. When whole peas were used for the experiments, the analyses show that in place of the proteid increase there is a decrease, with the formation of crystalline nitrogenous derivatives. Experiments were carried out to determine whether or not the proteid synthesis was due to enzyme action. Finely ground developing peas were treated with solutions of ammonium sulphate or asparagin and allowed to stand with antiseptics for varying lengths of time. In all cases there was a decrease in proteid content followed by a slight increase. In none of the tests did the final quantity of proteid nitrogen equal that at the beginning of the experiment.

ZALESKI's study of the proteid changes in ripening seeds showed that these

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[3] ZALESKI, W., Beiträge zur Kenntniss der Eiweissbildung in reifenden Samen. Ber. Deutsch. Bot. Gesells. **23**:126–132. 1905.

organs contained proteolytic enzymes, and in a second paper[4] he gives the results of his study of the protease in ripening peas. Autodigestion experiments were carried out with freshly ground developing peas, with a powder prepared by drying the tissues at 35–37° C., and with a powder made from ground peas in a manner analogous to ALBERT'S acetone method for making zymase preparations from yeast. Evidence of proteolytic activity was furnished by analyses showing a diminution of the proteid as the digestions progressed. The enzymes of peas in the earlier stages of development caused a much more active proteolysis than those from the seeds in more advanced stages. This greater vigor of the enzyme of younger tissues is brought out in experiments showing the influence of strong sugar solution and of potassium nitrate. These agents had little effect on the progress of autodigestion with young peas, but caused a noticeable inhibition in the tests with older ones. The proteolysis is hurried by the presence of a trace of alkali, but retarded by stronger alkalis and by acids. The optimum temperature lay between 40 and 50° C. The enzyme acted vigorously on Witte peptone.—ARTHUR L. DEAN.

MISS TAMMES[5] has tested the sensibility to differences of environment of several fluctuating characters in each of several species grown under more and less favorable soil conditions. Of the fifteen characters studied, fourteen agree with the experience of others who have studied the influence of nutrition on fluctuation, in showing a shifting of the curves to the left when the plants are grown on poor soil; but, as would have been expected, the corresponding characters in the different species and the different characters in the same species show considerable differences of sensibility, some being relatively stable, others showing a very marked response to changed conditions. As a measure of variability, the author follows VERSCHAFFELT in using the quartile (Q) divided by the mean instead of the standard deviation (σ) divided by the mean, which is used by English and American biometers. In comparing the sensibility she employs a new measure, the "sensibility-coefficient," which is the difference between the well-fed and poorly-fed plants with reference to the character in question, divided by the condition in the well-fed. It is obvious that this measure can be of use only in allowing the comparison of different characters in a single series of observations such as those presented, and not as an absolute measure of sensibility which would permit comparison with the sensibility-coefficients for the same characters under other conditions. In the well-fed plants the coefficients of variability for all the characters of a given species were found to be nearly alike, though the several species differed markedly from each other in this regard; but in the poorly-fed plants the variability of the several characters was very differently affected, being sometimes increased sometimes decreased.

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[4] ZALESKI, W., Zur Kenntniss der proteolytischen enzyme der reifenden Samen. Ber. Deutsch. Bot. Gesells. **23**:133–141. 1905.

[5] TAMMES, TINE, On the influence of nutrition on the fluctuating variability of some plants. Koninklijke Akad. Wetens. Amsterdam **7**:398–411. *pl. 1.* 1905.

Miss TAMMES[6] has also studied the periodicity in the occurrence of supernumerary leaflets in *Trifolium pratense quinquefolium* DeVries. She finds that there are two concurrent anomalies, namely, a division of the lateral leaflets and a division of the terminal leaflet. The former is much the more frequent and reaches its maximum development below the middle of the primary branches, while the latter reaches its maximum also on the primary stems but on the upper half near the inflorescence. Few supernumerary leaflets occur on branches of second, third, and fourth orders.—G. H. SHULL.

LUXBURG[7] has presented some experimental data and a very able discussion to show that our views of the distribution of growth in geotropically stimulated organs, based largely on the experiments of SACHS, are no longer tenable. After applying more approved methods in a reinvestigation of the results obtained by SACHS and NOLL especially, he finds it no longer permissible to regard any position as leaving the organ insensible to the geotropic stimulation. The thesis maintained by NOLL that the normal vertical position of an organ furnishes it a condition of indifference to geotropic stimulation is regarded by the author as a striking example of the overestimation of the value of curvature reactions as indicators of the perception of stimulation by gravitation. The absence of a curvature response by no means implies that the stimulus is not perceived. HERING'S results with inverted organs are regarded as rendering a perception in the erect position very probable; the absence of a curve means merely that an asymmetrical growth was not induced. The author advances the theory that geotropic curvatures are accomplished by two different but as yet not separately observed processes, whose concurrent operation involves an alteration in the rate of growth and an asymmetrical distribution of growth. That favorable objects may be found in which these two processes ordinarily combined may be separately observed is regarded as not impossible. The theory advanced is supported chiefly by the study of organs for which a resumption growth is a prerequisite to curvature. The reaction of organs in the position of normal equilibrium, in which case a curvature does not appear, is to be distinguished from that in which curvature does occur merely by this, that an asymmetrical distribution of growth necessary to produce the curve is not induced.—RAYMOND H. POND.

CORRENS[8] has published ten letters written by GREGOR MENDEL to CARL NÄGELI during the period of MENDEL'S greatest activity in the study of hybrids (1866–1873). NÄGELI was the recognized authority on Hieracium hybrids in nature, and MENDEL wrote him careful accounts of the progress of his experi-

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[6] TAMMES, TINE, Ein Beitrag zur Kenntniss von *Trifolium pratense quinquefolium* DeVries. Bot. Zeit. **62**:211–225. 1904.

[7] LUXBURG, GRAF. H., Untersuchungen über den Wachstumsverlauf bei der geotropistischen Bewegung. Jahrb. Wiss. Bot. **41**:399–457. 1905.

[8] CORRENS, C., Gregor Mendel's Briefe an Carl Nägeli 1866–1873. Ein Nachtrag zu den veröffentlichten Bastardierungsversuchen Mendels. Abhandl. Math.-Phys. Dasse Sächischen Gesells. Wiss. **29**:189–265. 1905.

ments, and also sent him much of his artificially produced hybrid material, particularly of Hieracium. The letters were written with great care, and as they report many hybrids that were not mentioned in MENDEL'S published works, they are an important addition to the literature of hybridization. CORRENS has carefully annotated the letters and added two appendices, in the first of which he discusses the bearing of parthenogenesis upon MENDEL'S results in Hieracium, pointing out that these letters can leave not the slightest doubt that true hybrids were secured, but inferring from the constancy of the hybrid forms in successive generations that there is no reduction division, and that consequently, following STRASBURGER, we should speak of apogamy rather than parthenogenesis in Hieracium. In the second appendix CORRENS considers the question whether sexual characters are inherited according to MENDEL'S principles, such a possibility having been suggested in one of these letters. After examining the various possible assumptions as to dominance and the purity or the hybrid character of the gametes with respect to sex, he concludes that sex-determinants are fundamentally unlike the ordinary character-units and incapable of being satisfactorily explained by the laws of dominance and the segregation of parental gametes.—G. H. SHULL.

LEWIS[9] has investigated the development of *Phytolacca decandra*, his main purpose being to follow the origin and fate of the endosperm, with special reference to its behavior during germination. The development of the microsporangium follows the usual course, the tapetal cells perhaps deserving mention in that they sometimes contain six nuclei, the average number being four. In the megasporangium one and sometimes two archesporial cells appear, and a tapetal cell is cut off. The endosperm grows rapidly, "forming a sac with a great central vacuole." The nuclei lie free in the cytoplasm of the endosperm and always divide amitotically. The embryo sac finally becomes the extensive cavity characteristic of campylotropous ovules. Walls later begin to appear in the micropylar endosperm, the cells encroach on the central cavity, and finally the endosperm is completely cellular except for a mass of cytoplasm at the chalazal end of the sac. The embryo in its early stages consists of a well-developed suspensor and a many-celled, undifferentiated, spherical embryo. Starch is observed to accumulate in the perisperm, notably next to the concavity of the curved embryo, which disorganizes the endosperm almost completely. In germination the embryo elongates, and the radicle is pushed through the endosperm cap and the seed coat. The cotyledons continue to elongate until the stem tip is free, and the cells of the thick endosperm cap remain turgid, persisting "as a thick ring of tissue clasping the bases of the cotyledons and stopping the opening made in the seed coat at germination."—J. M. C.

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[9] LEWIS, I. F., Notes on the development of *Phytolacca decandra* L. Johns Hopkins Univ. Circ. No. 178. pp. 35–43. *pls. 3*. 1905.